NERSC Machine Usage Characteristics

July 2008

Office of Science
U.S. DEPARTMENT OF ENERGY
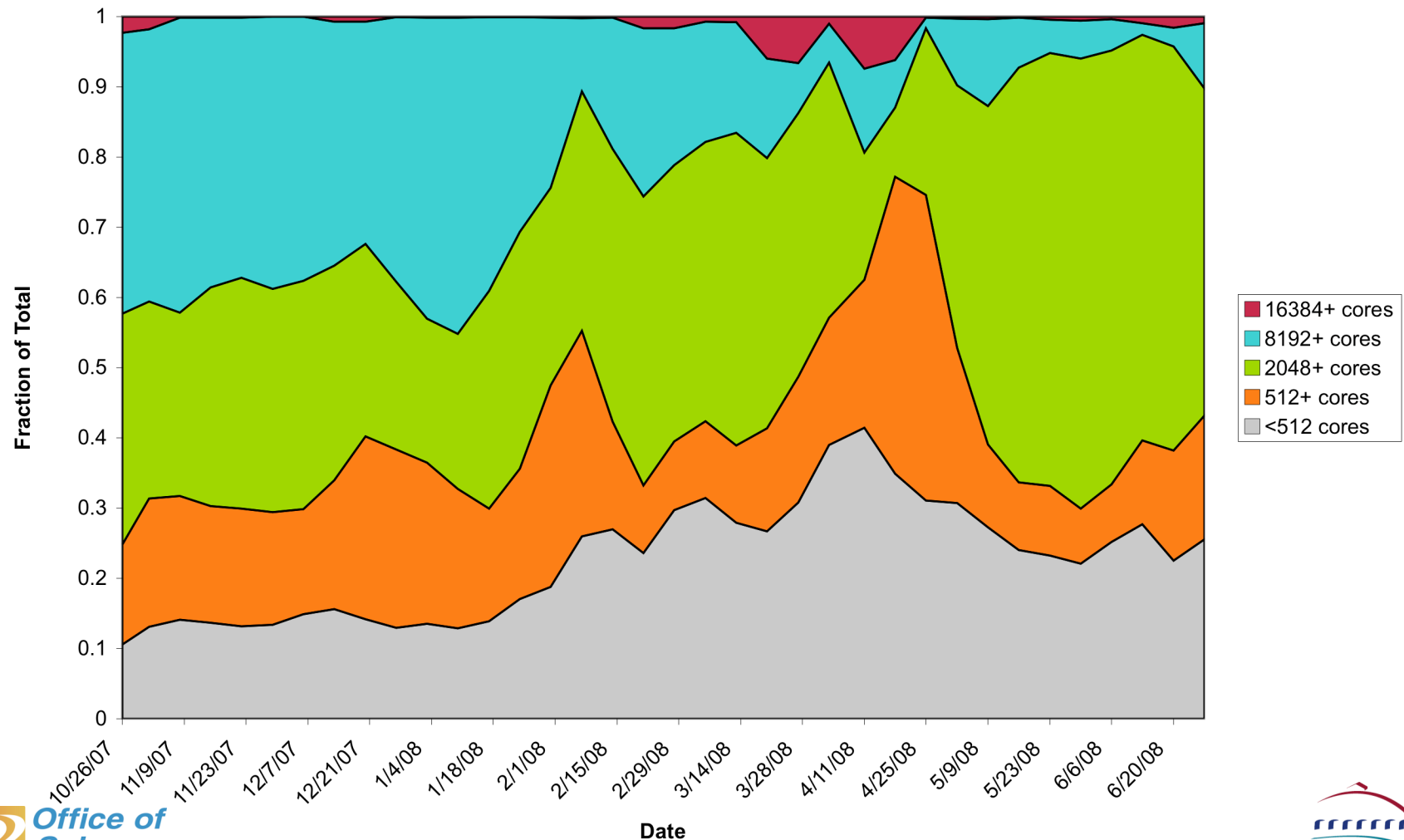
NERSC

BERKELEY LAB

Computing at Scale

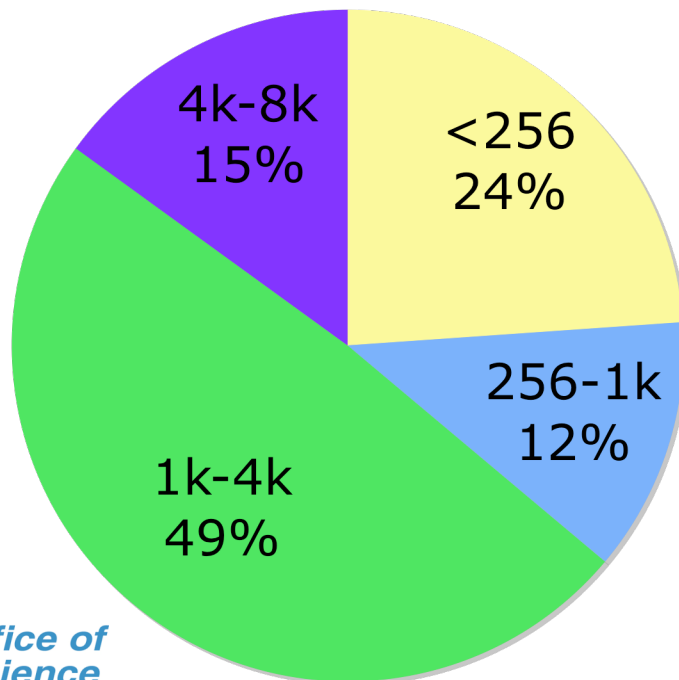**Seaborg Concurrency 06-07**
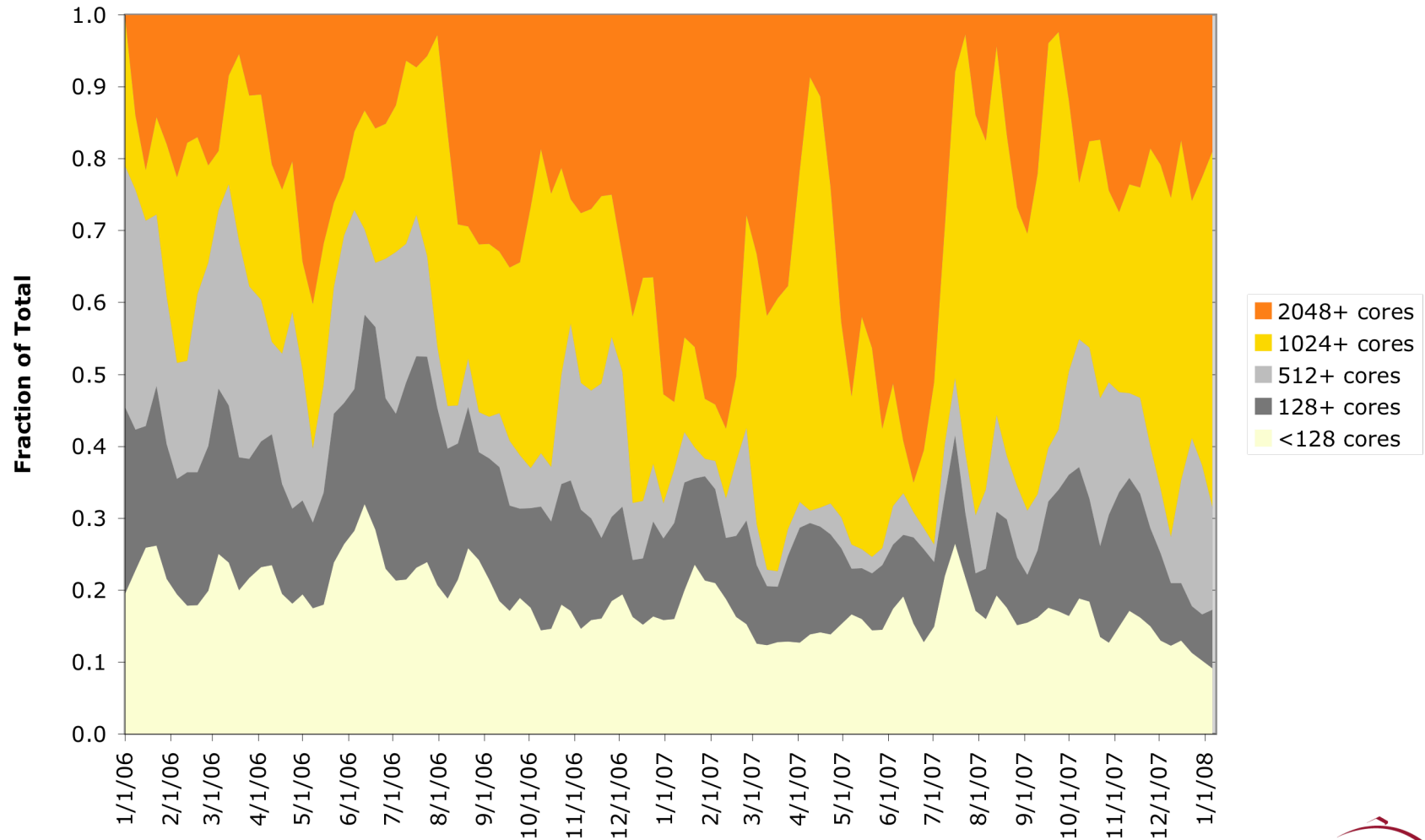
Computing at Scale
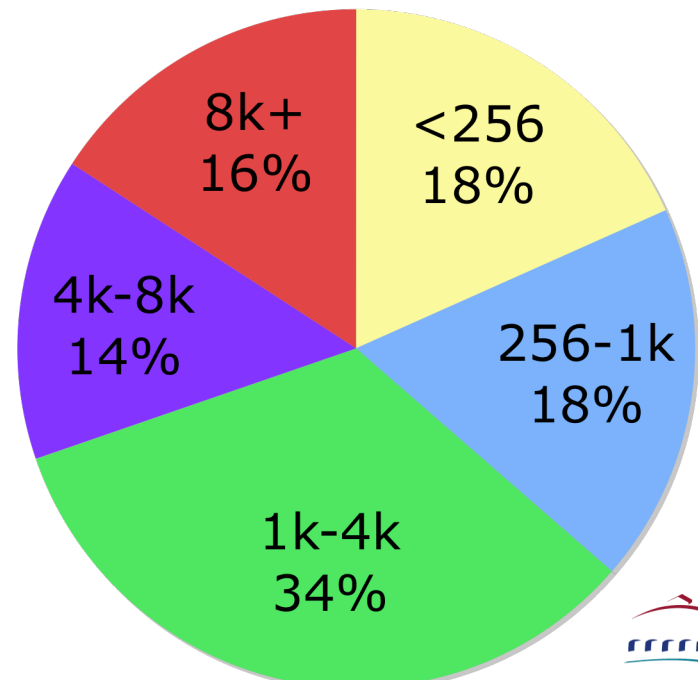
Franklin Concurrency

Computing at Scale

- **Historically, almost 75% of the workload has run on >500 processors**
- **During the first six months of production, 50% of Franklin workload runs on >2000 processors**
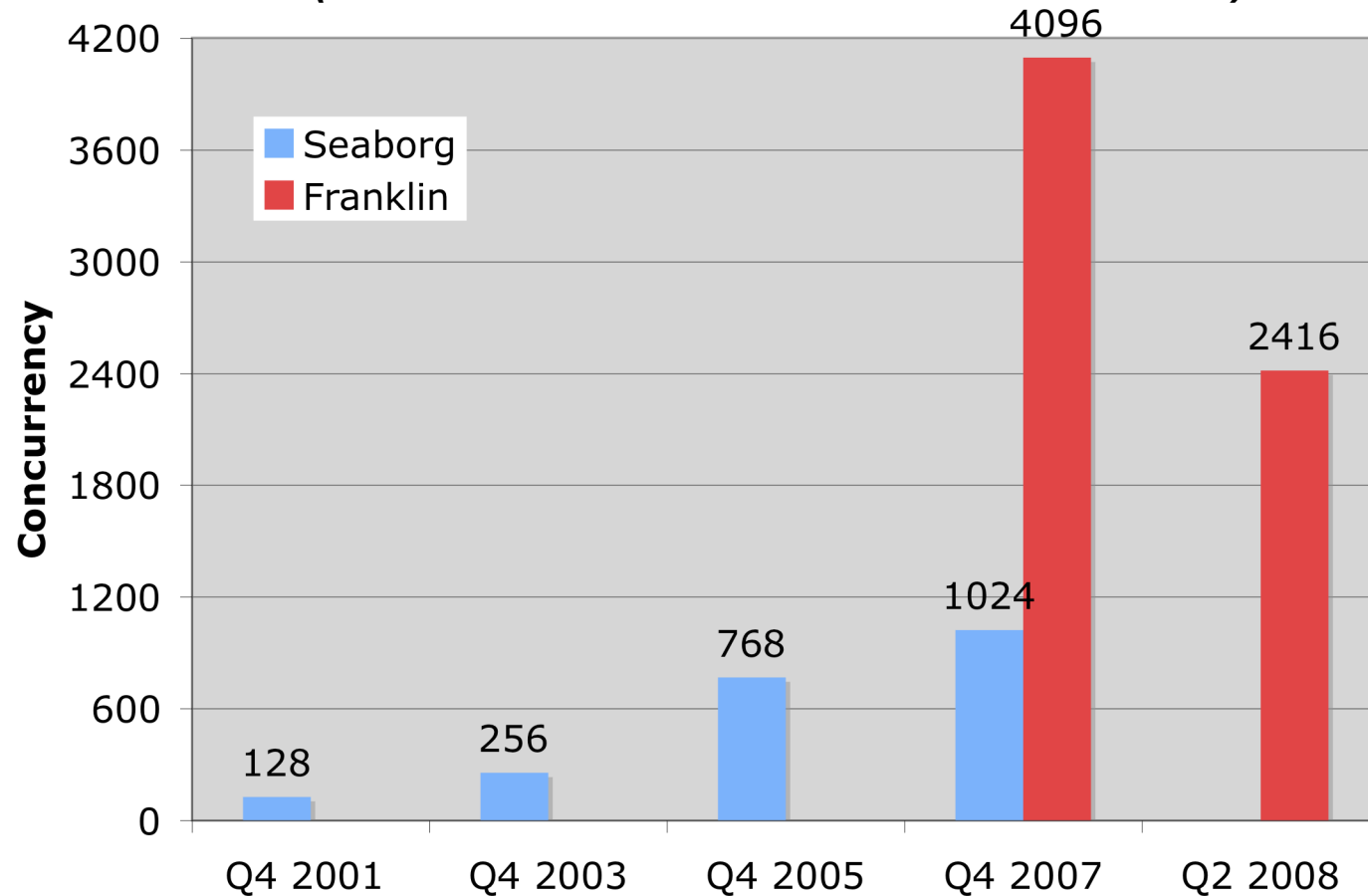
Job Concurrency on Seaborg (2007)

Job Concurrency on Franklin

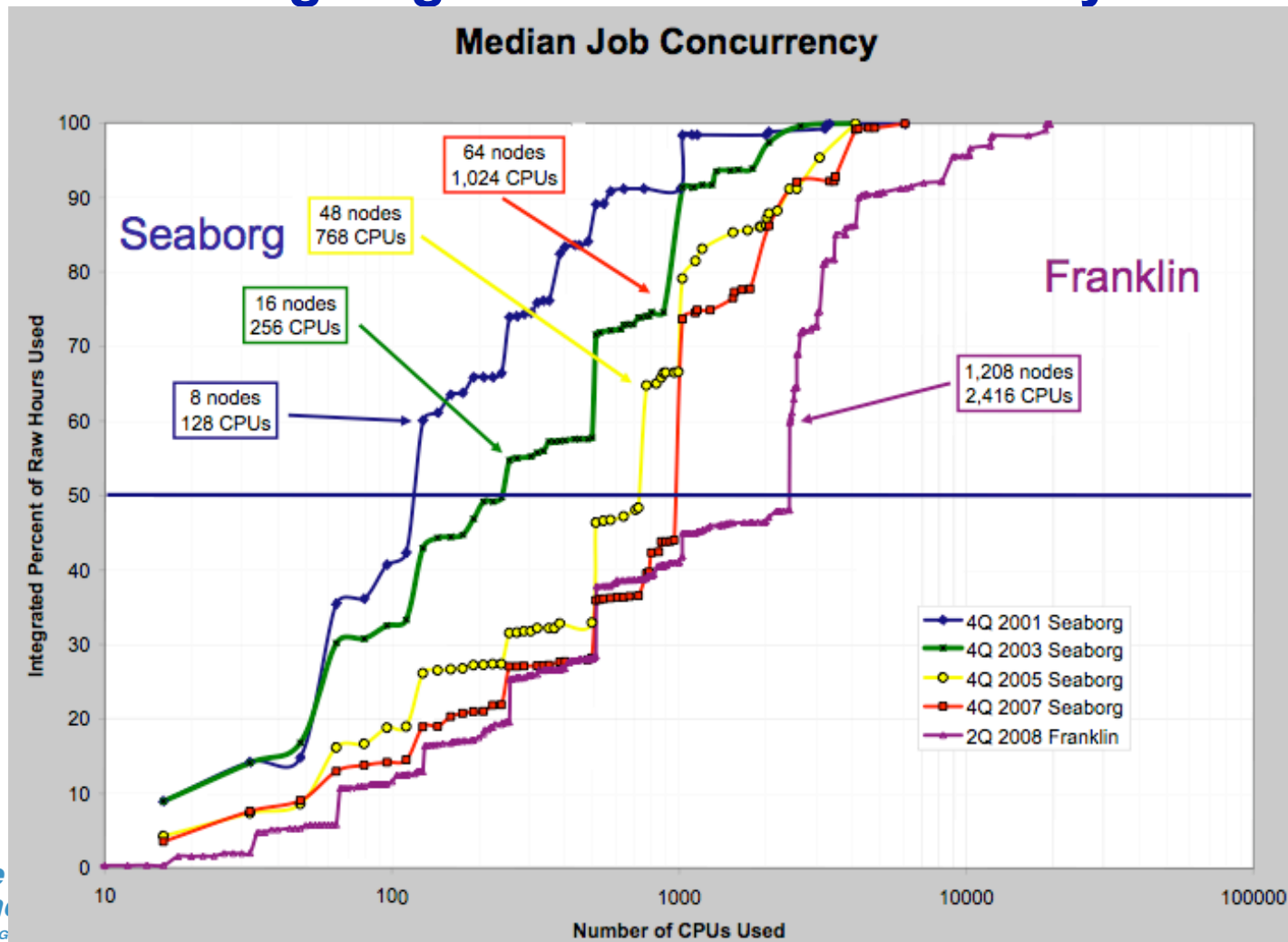# Transitioning to Larger Concurrencies

**Median Job Concurrency
(Job Size where 50% of Raw Hours Used)**
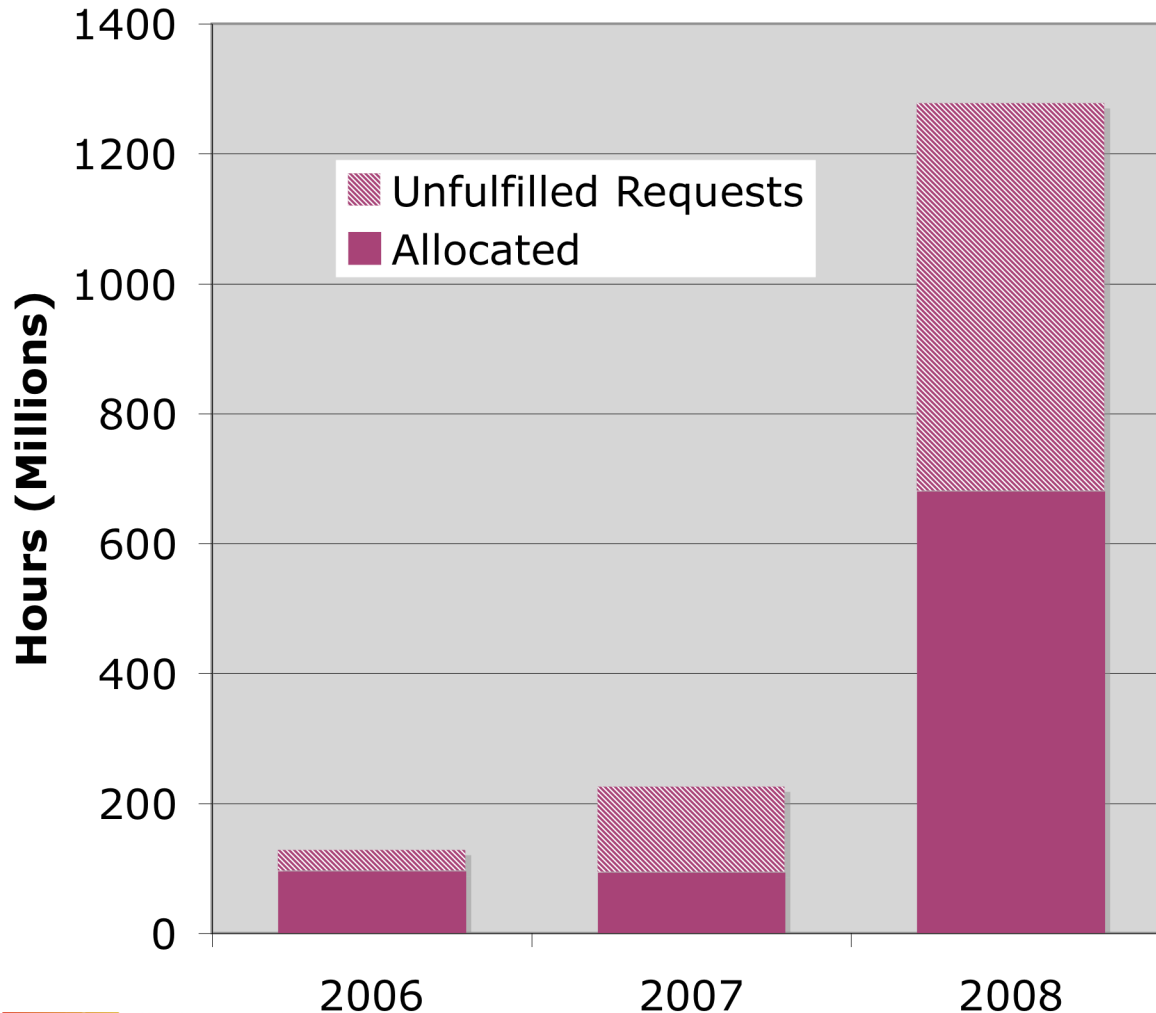
NERSC has enabled users to run at higher concurrencies

Transitioning to Larger Concurrencies

DOE users have successfully transitioned to using larger concurrencies each year
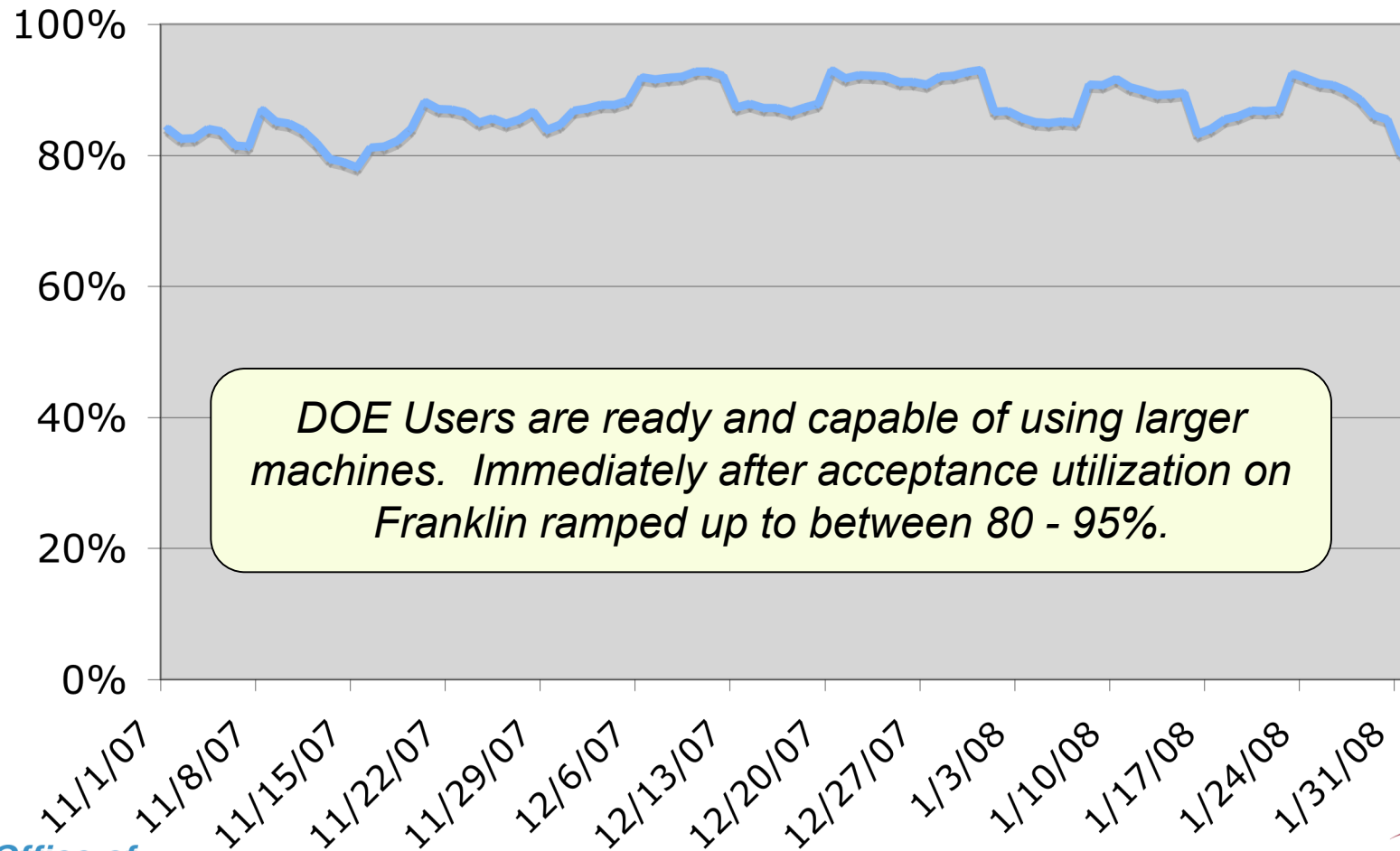
Demand for More Cycles

Compute Hours Requested vs Allocated

- *Each year DOE users request roughly twice as many hours as can be allocated*

- *Unfulfilled allocation requests amount to hundreds of millions of compute hours in 2008*

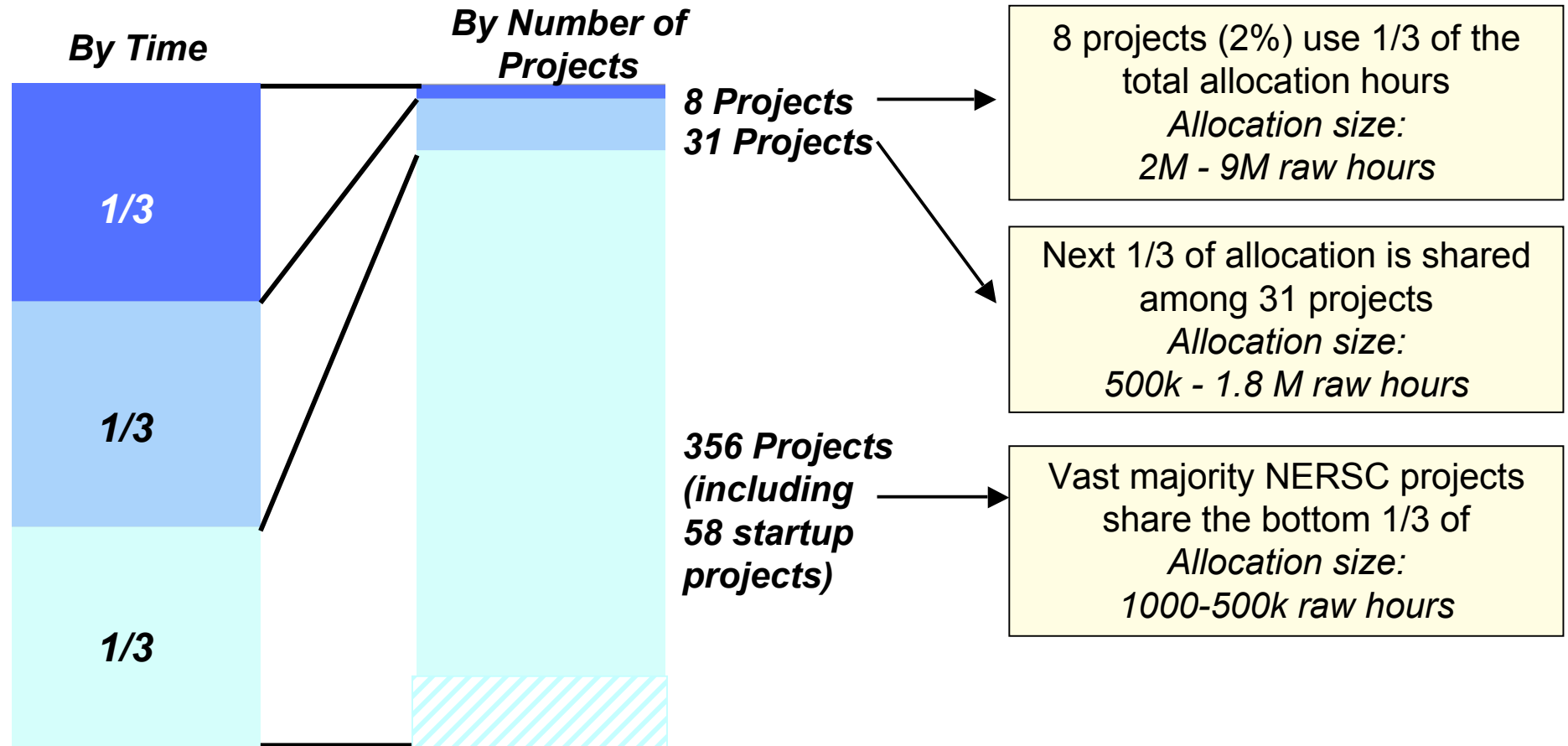# Fast Franklin Uptake

Franklin Utilization for 3 Months After Acceptance
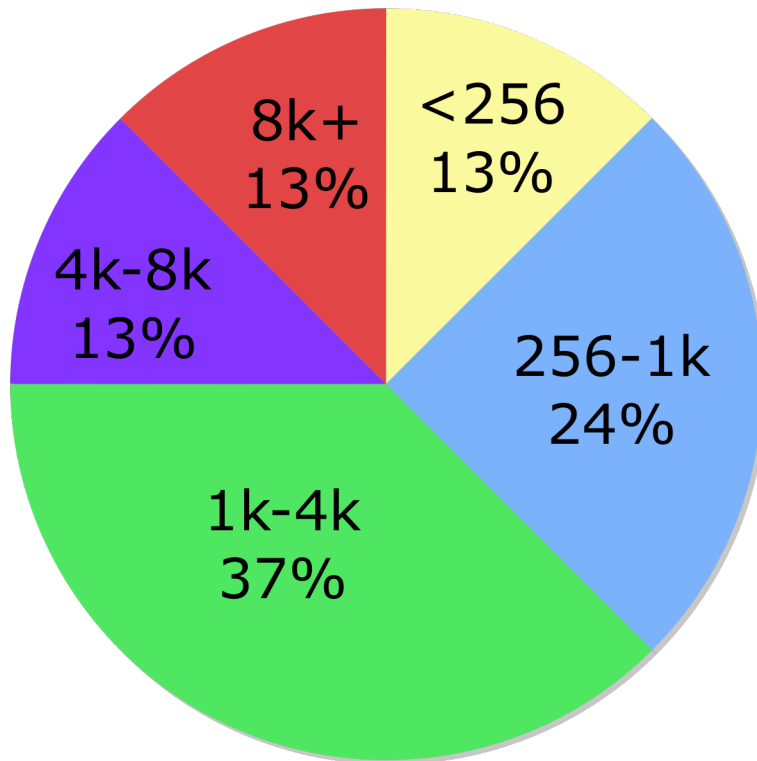**(7 day moving average)**

DOE Users are ready and capable of using larger machines. Immediately after acceptance utilization on Franklin ramped up to between 80 - 95%.

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NERSC Allocation Breakdown

Total NERSC allocation time divided into thirds

By Time

By Number of Projects

8 Projects
31 Projects

356 Projects (including 58 startup projects)

8 projects (2%) use 1/3 of the total allocation hours
Allocation size:
2M - 9M raw hours

Next 1/3 of allocation is shared among 31 projects
Allocation size:
500k - 1.8 M raw hours

Vast majority NERSC projects share the bottom 1/3 of
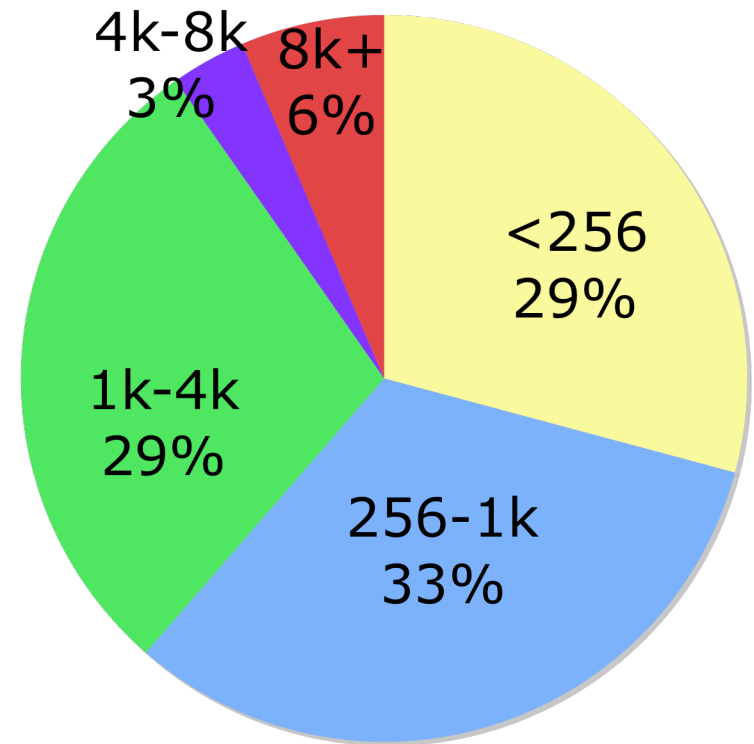*Allocation size:*
1000-500k raw hours

Concurrency on Franklin

Top Group of Users Most Frequent Concurrency

Middle Group of Users Most Frequent Concurrency

Both groups of users are capable of running high concurrency jobs …